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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/873,287	06/05/2001	Tomio Sugiyama	2635-16	4759

23117 7590 04/06/2006

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EXAMINER	
OLSEN, KAJ K	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 04/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/873,287	SUGIYAMA, TOMIO	
	Examiner	Art Unit	
	Kaj K. Olsen	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2, 4-6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tatumoto et al (USP 5,522,979) in view of either Kobayashi et al (USP 4,961,835) or Nanataki et al (USP 5,419,827) with or without evidence from the instant invention or Fujishiro et al (USP 4,105,524). Tatumoto and Nanataki are being cited and relied on for the first time with this office action. Fujishiro and Kobayashi were cited and relied on in previous office actions.

3. Tatumoto discloses a multilayered gas sensor comprising laminated layers comprising at least one solid electrolyte sheet 2 containing zirconia and yttria (col. 7, ll. 28-33) and at least one insulating sheet 4 containing alumina (col. 8, ll. 44-53). Tatumoto further discloses the presence of a heater 5 directly attached to a side surface of the insulating sheet to transfer heat generated in said heater to said insulating sheet and said solid electrolyte sheet. See fig. 1 and col. 8, ll. 1-6. Tatumoto further teaches that the solid electrolyte sheet and the insulating sheet having the heater are laminated and sintered to be integrally bonded to each other. See col. 8, ll. 54-64. Tatumoto does not explicitly disclose the use of silicon dioxide in the electrolyte of the sensor. Kobayashi teaches that a combination of yttria and silicon dioxide added to the electrolyte creates an electrolyte with a thermal expansion coefficient which is close to that of non-electrolytic ceramics. See col. 2, ll. 44-57. Nanataki similarly teaches that the addition of silicon

dioxide to the other stabilizing agents provides a sensor with excellent thermal shock resistance. See the abstract and col. 6, ll. 7-21. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teachings of either Kobayashi or Nanataki for the sensor of Tatumoto both to make the thermal expansion of the electrolyte as closely match that of the non-electrolyte ceramic 4 and to increase the thermal shock resistance of the electrolyte.

4. With respect to a crystal phase containing silicon dioxide that intervenes between the solid electrolyte sheet and the insulating sheet, the present disclosure evidences that silicon dioxide adding to the electrolyte followed by subsequent sintering results in the set forth bonding boundary. See page 5, lines 5-17 of the specification. This is further evidenced by the teaching of Fujishiro, which states that SiO_2 forms a "secondary phase distinct from the solid solution" and "exhibit strong affinity for the above metallic coatings". See col. 5, lines 21-26. Hence it would appear that it was already known in the prior art that materials like SiO_2 form a phase distinct from the solid electrolyte phase on the surface of the electrolyte (i.e. where the electrodes of Fujishiro are) and assist in the bonding of layers to that electrolyte. It is noted that Tatumoto has the electrolyte 2 bonding both electrode 31 and the insulating sheet 4 on the same surface (see fig. 1), this would indicate that if the SiO_2 formed a secondary phase next to the electrode (as Fujishiro suggests), then this secondary phase would also be present on the bonding boundary between the electrolyte and the insulating sheet. Because it would have been obvious for Tatumoto to add silicon dioxide to the electrolyte for the reasons set forth above, said incorporation of silicon dioxide would have inherently resulted in the claimed bonding boundary of the claim.

5. With respect to the addition of other components to the crystal phase, Tatumoto teaches the addition of other stabilizing agents like MgO and CaO could be utilized (col. 7, ll. 28-33) and Nanataki teaches using a combination of MgO and SiO_2 as a sintering aid (col. 6, ll. 30-37).

6. With respect to the specified thermal expansion coefficient and the sintering contraction coefficient, this would appear to be a result of the addition of SiO_2 and/or Al_2O_3 to the electrolyte. Kobayashi teaches adding SiO_2 to the electrolyte to bring its thermal expansion coefficient close to that of non-electrolytic ceramics (e.g. alumina). See col. 2, ll. 54-57. Nanataki teaches the addition of both SiO_2 and alumina to the electrolyte in concentrations overlapping that of the instant invention. Compare col. 5, l. 60 through col. 6, l. 21 of Nanataki with p. 23, ll. 27-31 of the instant invention. Hence, it would appear the specified levels of thermal expansion coefficient and sintering contraction coefficient would be inherent from the addition of SiO_2 or SiO_2 and Al_2O_3 to the electrolyte as taught by Kobayashi and Nanataki. See also Tatumoto, col. 2, ll. 15-22, 66, and 67 and the alternative rejection below.

7. With respect to the specified Miller index face, again this appears to be a result of the specified addition of SiO_2 to the electrolyte.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable Tatumoto in view of either Kobayashi or Nanataki as applied to claim 1 above and in further view of Ishiguro et al (USP 4,851,105).

9. This claim further differs by calling for the bonding boundary to be undulated. Ishiguro discloses a zirconia sheet bonded to an alumina-containing sheet 12 at an undulating boundary. See figure 2(b). It would have been obvious for Tatumoto in view of Kobayashi or Nanataki to

adopt the undulating boundary of Ishiguro in order to strengthen the anchoring/bonding of a zirconia sheet to an alumina sheet, as discussed at col. 6, lines 24-41 of Ishiguro.

10. Claim 5 is rejected in the alternative under 35 U.S.C. 103(a) as being unpatentable over Tatumoto in view of Kobayashi and Nanataki as applied to claim 1 above and in further view of JP 9-26409 (hereafter "JP '409").

11. In the rejection above, the examiner was of the opinion that the specified electrolyte compositions of Kobayashi and Nanataki inherently established the set forth thermal expansion coefficient. If Kobayashi and Nanataki are deemed to not inherently establish this, then JP '409 discloses that the electrolyte and insulating sheet should have a thermal expansion coefficient difference of between 0 and 0.2%. See p. 4, ll. 7-8 of the translation. It would have been obvious for Tatumoto in view of either Kobayashi or Nanataki to adopt a virtually zero difference between these coefficients, as taught by JP '409, in order to minimize thermal stress. Both Tatumoto and Kobayashi recognized the need for minimal thermal stress. See the discussion above.

12. Claim 6 is rejected in the alternative under 35 U.S.C. 103(a) as being unpatentable over Tatumoto in view of Kobayashi and Nanataki as applied to claim 1 above and in further view of JP 08-114571 (hereafter "JP '571").

13. In the rejection above, the examiner was of the opinion that the specified electrolyte compositions of Kobayashi and Nanataki inherently established the set forth sintering contraction coefficient. In addition, Tatumoto at col. 2, ll. 15-22, 66, and 67 appears to establish that the electrolyte and insulating sheet already had nearly identical contraction coefficients. If Kobayashi, Nanataki and Tatumoto are deemed to not inherently establish this, then JP '571

discloses such a sintering contraction coefficient difference. See the fourth line from the bottom of the English abstract. It would have been obvious for Tatumoto in view of Kobayashi and Nanataki to adopt this sintering contraction coefficient difference to minimize thermal stress.

Response to Arguments

14. Applicant's amendment to claim 1 overcame the previous use of Ueno and Yamada and those rejections have been withdrawn. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection necessitated by the amendment to the claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Thursday from 5:30 A.M. to 3:00 P.M. and on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753
April 3, 2006

KAJ K. OLSEN
PRIMARY EXAMINER